



TITLE:

# Inter-university Upper Atmosphere Global Observation NETwork (IUGONET)

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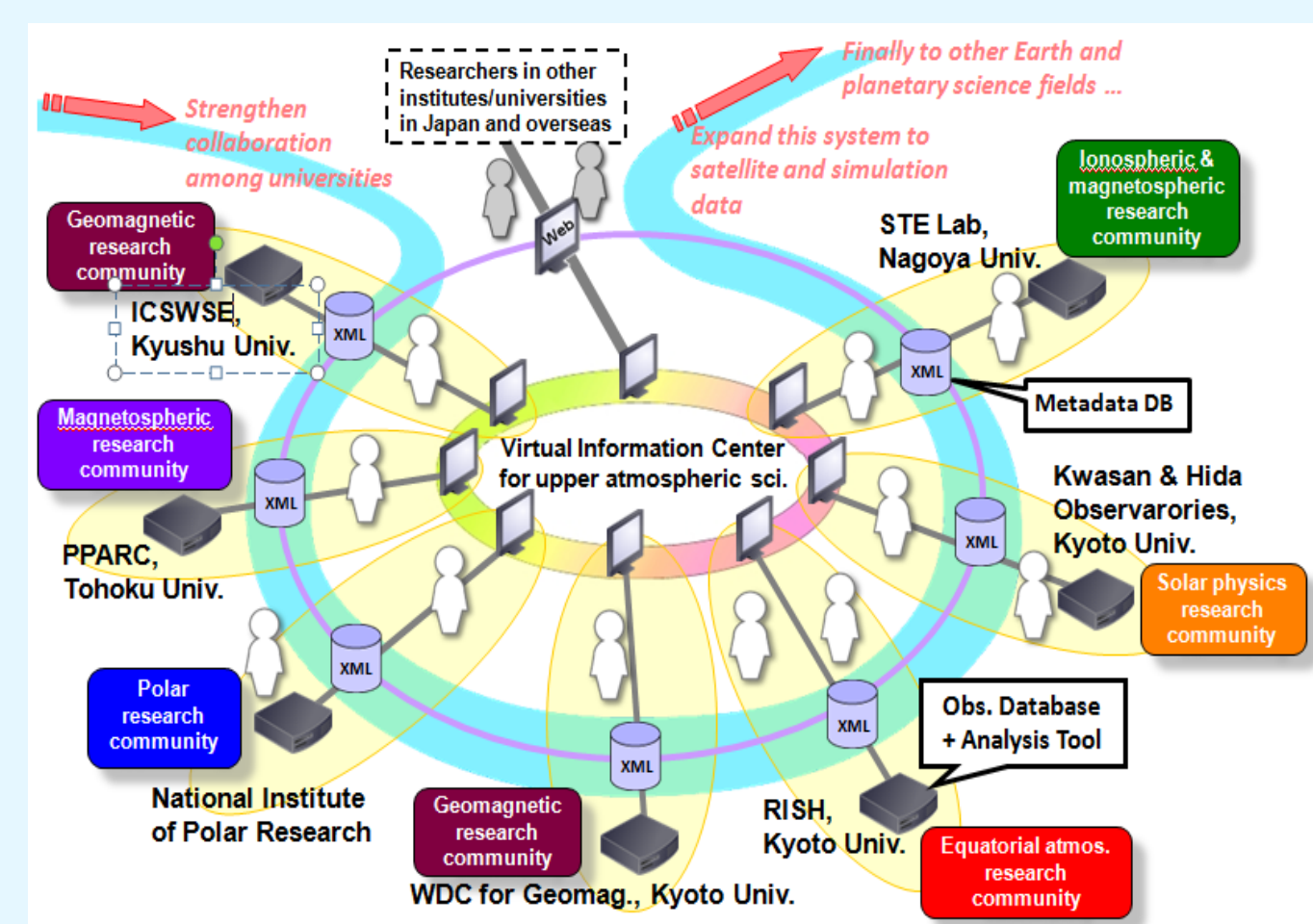
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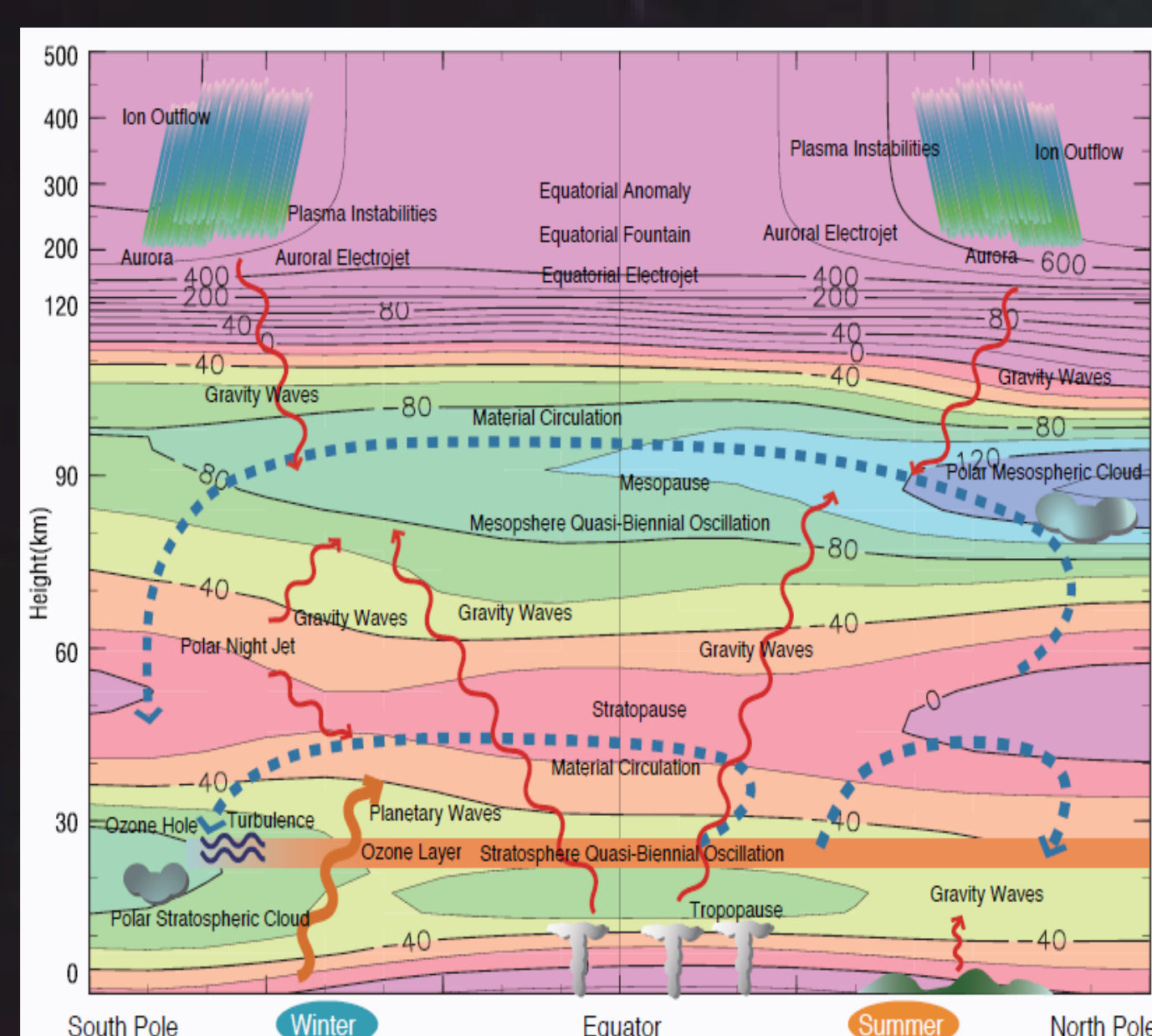


The **Inter-university Upper atmosphere Global Observation NETwork (IUGONET)** is a Japanese inter-university project for 6 years (FY2009-FY2014) by the **National Institute of Polar Research (NIPR)**, **Tohoku University**, **Nagoya University**, **Kyoto University**, and **Kyushu University** to **build a database of metadata for ground-based observations of the upper atmosphere**. The IUGONET institutes/universities have been collecting various types of data by radars, magnetometers, photometers, radio telescopes, helioscopes, etc. at various locations all over the world and at various altitude layers from the Earth's surface to the Sun. The metadata database will be of great help to researchers in efficiently finding and obtaining these observational data spread over the institutes/universities. This should also facilitate synthetic analysis of multi-disciplinary data, which will lead to new types of research in the upper atmosphere. The project has also been developing a software to help researchers download, visualize, and analyze the data provided from the IUGONET institutes/universities.



**IUGONET website:** <http://www.iugonet.org/>

## Importance of Upper Atmosphere dataset

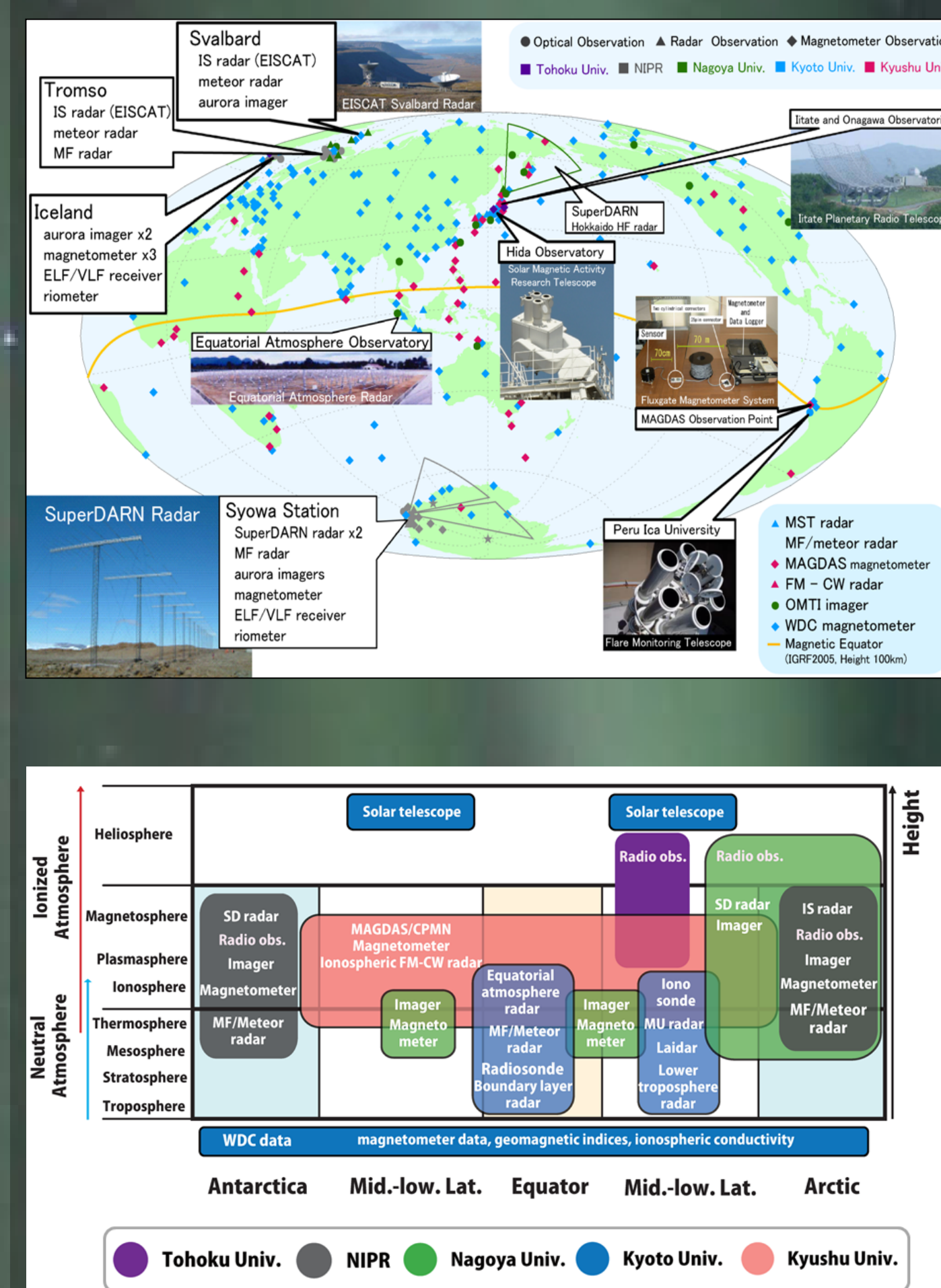


The upper atmosphere is considered a compound system consisting of the mesosphere, thermosphere, ionosphere, and magnetosphere. Although the different atmospheric layers are often referred to as independent regions, they are closely coupled by exchange of materials, momenta, and energies through complicated physical processes, for example,

- Energy input from the sun (e.g., ultraviolet radiation and the solar wind, drive convection of both neutral and charged particles,
- Momenta and energies from the stratosphere and troposphere injected by atmospheric waves,
- Many internal phenomena (e.g., electromagnetic energy transport, plasma convection, chemical reaction).

Therefore, we need to create integrated and organic links between a variety of ground-based observations made at various locations from the equator to the poles.

## IUGONET overcomes data diversity



We have various kinds of observational data acquired so far by global observation networks of radars, magnetometers, photometers, radio telescopes, helioscopes, etc. The databases of these ground-based observations, however, have been managed and maintained by each university/institute that conducted the observation. It is often the case that the data have been used by only a very few researchers who were involved in the observation campaign. There is no way for general, potential users to find out these databases due to lack of information. The IUGONET project aims at building a metadata database of the upper atmospheric data acquired by ground-based observations so that people can obtain information of various data from the metadata database. This will promote effective use of the observational data spread across universities and institutes, and then lead to new interdisciplinary, comprehensive studies regarding the upper atmosphere.

## Metadata database (MDDB)

The IUGONET metadata database has been released since last year! It is now available at <http://search.iugonet.org/iugonet/>.

**Number of current  
metadata**  
**6,414,698**  
including observatory (652),  
instrument (708)  
and data files

free word  
search

time range  
search

## spatial coverage search

type of metadata

**Show result  
of data  
search**

- The IUGONET project adopted **DSpace** as the metadata database platform. DSpace is a free software widely used by digital repositories at many universities over the world.
- DSpace consists of PostgreSQL, Tomcat, Lucene, and so on. It can provide fundamental functions of registering, retrieving, providing and harvesting of metadata written even in the IUGONET common metadata format.

- The “search result” shows part of metadata - title, description, and access URL if available - of data that match input keyword(s), time range, and spatial coverage.
- The metadata “title” is a link to the metadata details which include at least link(s) to metadata of contact person responsible to the data.
- The “access URL” leads the user to the web site of the observational database. The user may be able to obtain the data files if they are available online

## IUGONET Data Analysis Software suite (UDAS)

The official version of the IUGONET data analysis software, named UDAS (currently version 2.00.1), can be downloaded from the project website at <http://www.iugonet.org/en/software.html>.

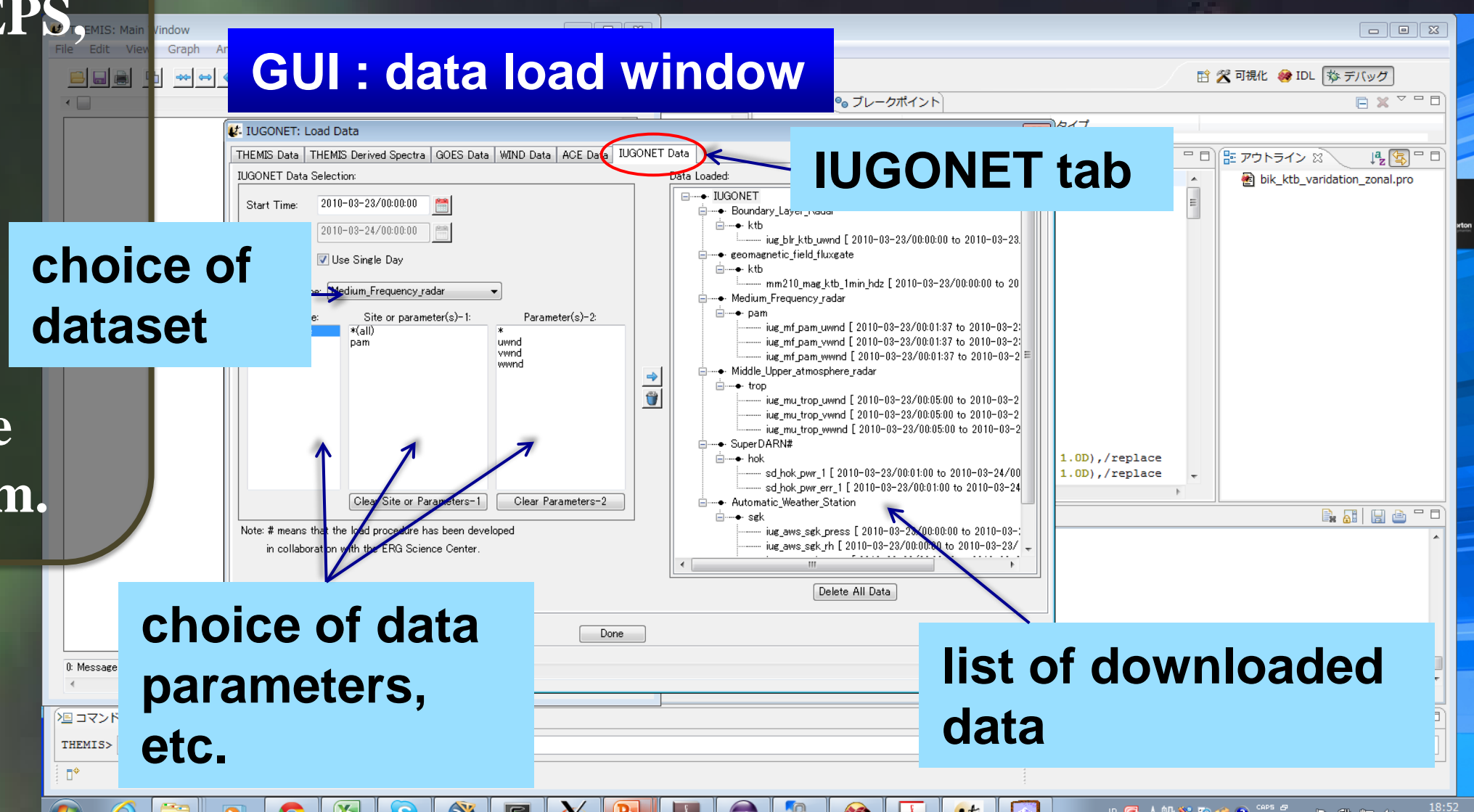
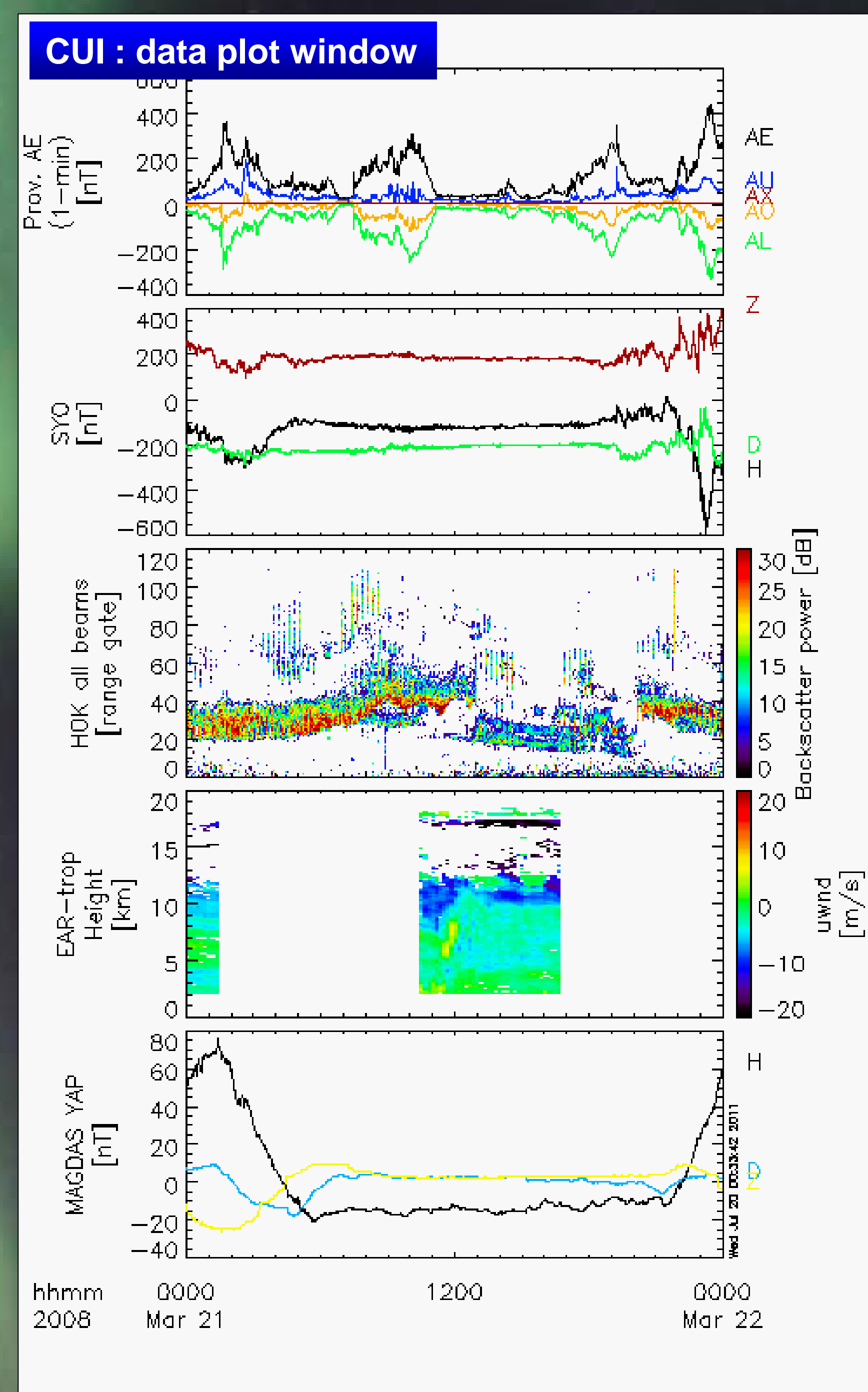
- The UDAS is written in IDL (Interactive Data Language), which is widely used in the fields of solar and terrestrial physics. We are developing the software on the basis of TDAS (THEMIS Data Analysis Software suite). The UDAS is distributed as a plug-in software of TDAS to handle data provided from the IUGONET universities/institutes.

- The TDAS already contains a lot of useful functions to enable users to download, visualize, and analyze various kinds of data. It is easy to make stacked plots of time series in order to compare various kind of data at one time.

- The UDAS accesses IUGONET data through the internet, and then the data are automatically downloaded onto the user's computer. Users can get and analyze the data without knowing data file locations.

- **Users need not to take care of data formats when analyzing the data. The data downloaded and plots created can be exported to a variety of data format (ASCII, PNG, JPEG, PS, EPS, etc.).**

- GUI (Graphical User Interface) as well as CUI (Character User Interface) is available so that even users who are not familiar with the data can visualize and analyze them.



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- We acknowledge the cooperation and generosity of the THEMIS Science Support Team in allowing us to use TDAS for our data analysis software (UDAS).
- The UDAS has been developed in collaboration with the ERG (Energization and Radiation in Geospace) Science Center.

